

Appendix Suggested SOP for SINCGARS

SOP

1. References:
 - a. TM 11-5820-890-10-1.
 - b. TM 11-5820-890-20-1.
 - c. FM 11-32.
2. Purpose: This suggested SOP establishes procedures and guidelines for operating the SINCGARS radios.
3. Scope: This suggested SOP should apply to all SINCGARS users.
4. General: SINCGARS is a solid-state transceiver which operates in the 30 to 87.975 MHz band in single-channel or FH operations. It replaces the current AN/PRC-77 and AN/VRC-12 series radio sets. It also replaces the AN/ARC-114 and AN/ARC-131. SINCGARS is compatible with the current tactical radio sets in the single-channel mode and the current VINSON COMSEC. It can provide EW protection and reduced electromagnetic signature.
5. Responsibilities:
 - a. The brigade signal officer has staff responsibility for the SINCGARS radios to-include-issuing SOIs, TSKs, and hopset variables.
 - b. The battalion signal officer is responsible for time management and distribution within the respective units.
6. Operating procedures:
 - a. Net sync time (NST). The battalion signal officer obtains and distributes the NST standard to a ± 1 second accuracy to all NCSs. The NCS loads this NST into the SINCGARS radio using local fill procedures. This time must be the first NST stored in SINCGARS since it will maintain net-to-net communications.
 - (1) SINCGARS has an internal clock, but each preset maintains its own net time. Do not be confused that net times are different between presets or that they are different from the "wall clock" at brigade or battalion. If the radio is in the net, the NCS automatically (slowly) corrects the error.

Therefore, storing correct NST in the NCS is important. If the radio is out of the net, and the NST is also in error, follow changing net identifier procedures.

(2) Once a net is open, net members do not enter additional time of day (TOD) via the front panel keypad. If this is done by error, all previously loaded preset TOD are changed and communications on those channels can be lost.

(3) Julian day (JD) is the last two digits of the Julian date. Hence, Julian date 90 is JD 90, Julian date 102 is JD 02, and so on. Time standard is zulu time.

(4) The NCS and alternate NCS receive transmissions in the primary net before receiving an ERF for their secondary nets (other presets).

(5) One of the primary functions of the FH/M is to maintain a time standard for the net. Therefore, only one RT in the net will be the FH/M RT. This will be the NCS RT. Whenever an alternate NCS returns to a net (FXXX), the operator announces in which mode the operator is returning (for example, C13 in FH or C13 in FH/M area). The NCS confirms the transmission. Should the NCS radio fail during any part of the mission, the alternate NCS goes to the FH/M mode. Using a backup radio from any other net member as FH/M is unacceptable unless the first NST loaded in the RT came from the alternate NCS.

b. Initial net opening. Nets are initially opened in the marshaling area via the COLD START method or as directed by the NCS. The following items will have been prepositioned via local fill by the radio operators:

- Net members:
 - TSK.
 - Manual frequency.
 - Cue frequency.
 - Common lockout(s).
- NCS will have the above variables and the following:
 - Hopset with the correct net identifier.
 - NST.
 - Dedicated lockout(s) (if required).

(1) The alternate NCS ensures that the SINCGARS does not have a TOD which was previously stored.

(2) At the designated time, the net members begin monitoring the FH manual preset (COLD START).

(3) The NCS conducts a net call to ensure all members are ready to receive an ERF. (If a net member is not available, the NCS may choose to open the net and request the alternate NCS to recover the net member(s) later.)

(4) Following procedures in the SINCGARS operator's manual, the NCS will ERF the net identifier to its net members. After all net members acknowledge receipt and storage of the net identifier, the NCS will ERF any required unique lockouts. ALL lockouts must be ERF'd and stored in each net member's radio.

(5) The NCS indicates the hopset number to be stored. After all net members acknowledge receipt and storage of the hopset, the NCS directs the net to go to its primary hopset.

(6) The NCS conducts a net call to ensure all net members are in contact.

(7) The NCS continues to ERF other presets on the primary FH net which its net members may require. With each ERF, the NCS indicates a preferred preset position where the net members should store the additional hopsets. The NCS does not conduct communications checks with its members on a hopset that does not belong to his net since this can disrupt these nets. However, the operator must turn the hopset selector to each position to verify that the preset information was correctly ERF'd.

(8) Upon ERFing all hopsets required by net members, the NCS makes a final net call and then declares the net open.

(9) Since the net opening occurs in the marshaling area, the lowest power output is used. Medium power output is an acceptable starting RF level. Other power settings are used as the operational deployment requires.

(10) After the initial net opening, the NCS and alternate NCS minimize their "out of net" time so that the most accurate clock in the RT is active. This keeps the net NST as stable as possible.

(11) ERFing the hopsets for the other presets does not mean that the net member is in those nets. Net members and the NCS may need to use the LNE mode to enter those nets.

c. LNE. There are two main reasons to perform an LNE:

- A net member missed initial net opening and is therefore missing all or part of the ECCM variables.
- A net member lost contact with the net, resulting in the late entrant having a different preset time than that used by the net (net time).

(1) The first case (missing initial net opening) requires the operator to use the cue and ERF mode.

(2) A net member that loses contact with the net may lose net time accuracy. Examples are--

- A radio that is turned off for more than 24 hours (SINCGARS clock stops).
- A radio that was in the net goes to another preset, talks on that preset, and when the RT is returned to the primary net (preset) the radio has no communications.
- A radio that is off for less than 24 hours while the net remains active.

The operator must first determine if he is out of range (distance) before LNE functions are used. The operator determines this from previous SINCGARS range (distance) experiences. If he believes the RT preset time is not correct, the following procedures can be used.

(3) If the RT has been turned "OFF" for more than 24 hours, a new NST must be entered via front panel. JD must also be set. (Note that an RT which is turned off for 25 hours will show JD short one day and the time off by 1 hour.)

(4) If an RT has been turned off for less than 24 hours, the operator should follow these procedures:

(a) Attempt to call the net by keying the RT (push-to-talk).

(b) If the above fails, set the radio into the late entry (L.E.) mode by pressing "FREQ" and "3/(L.E.)" on the keypad. DO NOT call the net unless you hear activity on the net. Once you hear activity on the net, transmit to the NCS following proper radio procedures and indicate you want to enter a net.

(c) If there is no activity on the net, the procedures in the above paragraph will not work. The LFXXX remains in the display until a net transmission is received or the operator gets the RT out of this mode. The operator can try to reach the net by transmitting but must keep track of the number of times he transmits. If no transmissions are received, the operator must pull the RT out of L.E. after the fifth transmission.

NOTE: The L.E. mode works only if NST for that preset is off by less than 1 minute.

CAUTION: THE OPERATOR MUST EXIT THE L.E. MODE AT ONE OF THESE POINTS OR HIS CLOCK WILL HAVE BEEN PERMANENTLY CHANGED.

(d) If the above procedure does not allow the operator to get into the net, the cue and ERF method is used.

(5) The procedure of paragraph (4) above is used whenever time permits since it increases ECCM protection. However, if time is more critical than ECCM protection, the cue and ERF method is used.

(6) Late entry procedures may be required by a net member that received ERF from an NCS on his primary net and that NCS does not belong to the second net. (For example, receiving ERF on the co-net for the battalion nets.)

d. Changing net identifiers. Changing net identifiers using RT front panel operations will only be performed by trained NCS and alternate NCS operators. Therefore, local fill is performed only when one of the above individuals is available. Exception is taken for the 31Vs who received this training and are maintaining time in accordance with the battalion signal officer requirements.

e. TSK variable procedures.

(1) A TSK variable is loaded in ECCM fill devices. This variable is initially identified as T1.

(2) All radios will have the same TSK variable loaded into the operating memory.

NOTE: A backup variable is loaded into the SINCGARS radio only at the direction of the NCS. If the display shows "HLD t" when the function switch is in the "LD-V" position, a second TSK was loaded into the radio.

f. Cue. A cue is used when a single-channel radio needs to access an FH net. This procedure is used only by personnel that need access to the net. The cue frequency can be found in the BECS SOI for each separate net.

NOTE: Users must understand that to cue an FH net, the net must be passive. If the net is active, there will be no indication on the SINCGARS radio, therefore, the "cueing" radio operator must continue to try to establish communications until his cue is received.

g. Cue procedures.

(1) Cue RT goes to single-channel on the proper frequency. The VINSON is set to plaintext (PT). The RT is keyed for at least 4 seconds.

(2) Cue RT operator transmits again with a net call.

(3) The radio designated to answer the cue drops out of the net to respond to the cue using precoordinated procedures.

(4) Assuming the alternate NCS is tasked to respond to the cue, the operator drops off the net and waits for a net call to confirm it is a station that should have access to the net.

(5) The alternate NCS directs to go to FH manual if the cueing station is a SINCGARS radio OR requests to go to ciphertext (CT) if the cueing station is a single-channel radio. The objectives are to increase ECCM and COMSEC postures as quickly as possible.

(6) The operator responding to a cue WILL NOT respond on the cue channel until the cueing party transmits its call sign.

h. Retransmission station. A retransmission (RETRANS) station is dedicated, as necessary, in support of CNR. The RETRANS station is used whenever the net members are out of communications because they are beyond SINCGARS distance capability or the net member is not LOS with the other net member it is trying to communicate.

(1) The RETRANS station is assigned to a net. The NCS for that net is responsible for updating the RETRANS variables and NST.

(2) Both RTs at the RETRANS participate on the primary net during initial net opening.

(3) The RETRANS station cannot automatically retransmit cue nor ERFs. Therefore, the RETRANS operator responds to cues assigned to the RETRANS hopset and acts as an NCS should any station require an ERF as previously directed by the NCS. The ERF function must be performed with the radio in the FH/M position.

NOTE: During normal RETRANS operations, both RTs at the RETRANS should be in the FH MODE (not in the FH/M).

i. General points to remember.

(1) All FH radios must be turned on every 24 hours if the JD is to be maintained. If not, the radio shuts off its clock and goes into the battery conservation mode.

(a) Whenever possible the radio that is turned on for JD reasons calls into its primary net and time permitting into the secondary nets.

(b) If the RT is not turned on within 24 hours, the RT displays an incorrect JD/zulu time the next time the RT is turned on.

(2) The NCS in coordination with the BSO assigns an alternate NCS. The NCS is responsible for net discipline and NST requirements by ensuring that the net members follow this SOP.

(3) Each NCS (and alternate NCS) has an ECCM fill device at their location.

j. Physical security. SINCGARS variables are not classified. However, operations security (OPSEC) is enforced to prevent theft and use by unauthorized personnel. Hence, loaded ECCM fill devices and SINCGARS radios are afforded physical security to satisfy this requirement. This requirement is similar to the requirement needed for a VRC-12 which is left set to a frequency listed on an SOI for a net.

k. Battery considerations.

(1) The SINCGARS main battery BA-5590 estimated battery life is around 12 hours, based on a ratio of nine messages received to one transmitted. The battery life indicator is used in accordance with TM 11-5820-890-10-1. AT NO TIME WILL THE BATTERY BE USED IF THE BATTERY LIFE READS 8 OR MORE.

(2) The BA-1372 holding battery's life depends on temperature and the length of time the radio is left in the OFF position. This time could be as short as 10 days or as long as 2 months depending on the use. When the radio is mounted in a vehicle, leave the power switch to the SINCGARS mount (CB1) in the ON position. In manpack applications, the holding battery is not used if the primary battery is connected and the radio is set to OFF. This increases the life of the holding battery. As a reminder, once the holding battery goes dead, the radio's presets must be reloaded after a new battery is installed.

(a) A weak holding battery causes the RT to lose NST before the RT loses hopset/lockout information. If vehicle power or the main battery is used as a backup to the holding battery, a weak holding battery may not be noticed until the other power source is removed or is also weak.

(b) If the radio is left off during extended times, the operator sets the vehicular CB1 switch to OFF. This saves vehicle battery power.

(c) In tracked vehicles, the vehicle breaker is normally set to OFF; therefore, vehicle power is not used by SINCGARS. This increases the number of times this battery is replaced.

1. References. A list of ready reference reminders is provided as annexes to this SOP.

Annex A - NCS Operations

1. Before operations begin (24 to 48 hours prior):

- Ensure that MX-10579 ECCM fill devices have a fresh battery installed and the installation date is properly posted. Also ensure all net members' radios have new holdup batteries installed, date posted, and polarity correct.

- Ensure that ECCM fill device batteries are changed at least once per month at a time when another fill device is available to reload variables. Use the ALL position during loading to minimize filling errors.

- Ensure that the signal officer provides a listing of all NET IDENTIFIERS and COMMON LOCKOUTS needed for your net's operation and that they are properly labeled and loaded in your fill devices. Also ensure SOI data is readable and current.

- Ensure that the correct TSK is loaded in your fill devices and that current variables are properly annotated on the side of the MX-10579.

- Appoint an alternate NCS and ensure he understands responsibilities for answering CUE, proper authentication procedures, and ERF. Delegate these functions so the NCS does not have to leave the NET unattended.

- Coordinate with your unit repairman to ensure that radios returning to field service after maintenance have all correct variables loaded before being deployed (TEK, NET ID, LOCKOUT, and nets current NST).

- Enforce strict OPSEC procedures for all MX-10579 fill devices that contain current or future TSKs even though these variables are unclassified. Remember, a lost TSK can intercept an ERF on the MANUAL COLD START channel and allow an unwanted radio to enter your net.

- Coordinate NET initialization plans and time schedule using COLD START ERF in a common motor pool or staging area to ensure all net members are present at the same time. Use low power whenever possible for net opening and remember that the physical control zone for a COLD START opening at this power level extends out to a 1-kilometer distance. Medium power extends out to 4 kilometers, high power extends to 16 kilometers, and power amplifier power extends as far as 35 kilometers depending on receiver antenna height. Consider having RTs brought to a common area where they can be filled by coax connection to NCS radio and then returned to the vehicle in the ready-to-use condition. This eliminates the need for last minute COLD START and communications difficulties when eyeball contact is not available. Manpack batteries could be used to temporarily power RTs, and variables would be retained by the holdup battery during transit back to vehicle.

Annex A - NCS Operations (continued)

- Plan on acquiring alternate FH NET PRESETS by using active FH nets for ERF from higher headquarters. Remember that an ERF on an active FH net is less vulnerable to intercept from the OPSEC viewpoint and is less likely to be pinpointed by direction finding.

- Plan on getting Universal Time from the signal officer directed time standard and ensure that this time can be transferred into your radio to an accuracy of ± 1 second.

2. Initializing your radio (4 to 6 hours prior):

- Ensure that your radio has been completely zeroized (NO TSK, NET ID, COMMON or UNIQUE LOCKOUTS, and TOD) before attempting to load your radio. The same procedure should be used for your alternate NCS and is desirable for all net members. The purpose for this extra step is to know the baseline all radios are starting from since residual variables could affect net initialization.

- Load all your net variables first and establish communications with your ALT NCS on your FH net before proceeding to load any alternate NET presets. The purpose is to ensure correct fill device loading (TSK, COMMON LOCKOUTS, NET ID) and to lock in settings in both your and the alternate NCS radio. Verify that all presets (FH, MANUAL, and CUE) are as stated in the current SOL.

- Remember to set your assigned MANUAL and CUE frequencies while the radio is in the single-channel mode. Enter the correct NET ID using keyboard dial up procedures with radio in FH/M.

- Be sure all COMMON LOCKOUTS identified as necessary by the signal officer for your NET operations have been loaded.

- Assign MX-10579 fill devices to selected NET members and instruct them on NET opening times. Ensure the proper TSK is loaded in all NET MEMBER radios. Suggest that all COMMON LOCKOUTS are loaded at the same time the TSK is being filled. Instruct the loading members to load the NET MANUAL frequency into each NET member's radio and set mode switch to FH, function switch to LB, and KY-57 to CT.

- If as NCS you have more than one radio in your vehicle or at your location, use open presets in the other radios to serve as backup for the FH variable in the primary radio.

3. Opening your NET:

- At the prescribed time for NET opening, call NET MEMBERS and request them to standby for ERF. Call up your NST into Holding Memory and ERF the data on the MANUAL channel. The transmission should be made in the low power mode to minimize intercept probability. Remember that proper OPSEC

Annex A - NCS Operations (continued)

procedures would only require one ERF transmission and that subsequent COLD START ERF attempts greatly increase vulnerability of your net.

- After the ERF has been sent, direct NET MEMBERS to store received variables and return the function switch to squelch ON position.
- Allow sufficient time for the variables to be stored and place a NET call on the MANUAL channel requesting NET MEMBERS to check in by the numbers.
- After the check-in, direct NET members to switch to the FH preset where variables were stored and stand by for a NET CALL on the FH NET.
- Place a NET CALL on the FH NET and request the NET MEMBERS to check in by the numbers. This ensures the FH variables and the time have been locked into their radios.
- If as NCS you have more than one radio in your vehicle or at your location, use open presets in the other radios to serve as backup for the FH variables in the primary radio.
- ERF all other FH NET IDs required by your NET MEMBERS (RXMT) over the operating FH net established and perform communications checks. This follows good OPSEC procedures since FH transmissions are less vulnerable to being compromised.
- Request the alternate NCS to attend to any NET MEMBERS which did not receive the initial COLD START ERF and attempt to bring these radios into the NET with no more than one other COLD START ERF.
- Instruct all NET MEMBERS on the power setting (LO, MED, HI, PA) they should use for the remainder of the mission and to change function switch from LD to SQ ON.
- Ensure only your radio as NCS is in the FH/M mode. All other net radios should be in the FH mode.

4. ERFing new variable after NET opening: Use proper OPSEC procedures and ERF new variables from your NET over an active FH NET as opposed to COLD START. Remember FH operation is less vulnerable to direction finding, jamming, and compromise than COLD START.

5. After NET is open: The NCS and ALT NCS should minimize the OFF air time of their radios to take advantage of the most accurate time reference in the RT and keep the overall NET TOD as stable as possible. Time errors accumulate fastest in radios that are turned OFF.

Annex B - Signal Officer

1. Ensure that all nets are provided a Universal Time accurate to ± 1 second relative a fixed standard, such as WWV or other local source.
2. Ensure all SOIs are readable.
3. Ensure accurate audit trails for generating, filling FH variables, and labeling of fill devices.
4. Encourage proper OPSEC procedures.
5. Ensure the NCS knows which LOCKOUTS are used with each net under his control.

Annex C - Retransmission Operations

1. Before operations begin:

- Ensure that SOI has retransmission NET ID, and CUE and MANUAL frequencies listed.
- Coordinate with your NCS and make sure that responsibilities for answering CUE on one side of the RXMT NET are understood.
- Ensure that authentication and ERF procedures/responsibilities are understood.

2. Initializing your radio for NET opening:

- Ensure your radio was zeroized to purge all old variables before loading TSK and LOCKOUTS prior to COLD START ERF.
- Ensure your radio is ready to receive the first COLD START ERF by having the MANUAL frequency loaded, function switch set to LD, preset to MANUAL, and mode switch to FH.
- Follow all NCS instructions during NET opening.
- Ensure both sides of the FH net are initialized in both of your RTs so that backup is available.
- Ensure the primary link is in the FH mode and the secondary link is in the FH/M mode when actually ERFing from the RXMT site.
- Keep radios in SQ ON function and go to RXMT only when directed to do so by NCS.

Annex D - MX- 10579 Fill Device Operators

1. Remember to practice proper OPSEC procedures for loaded fill devices. While variables are unclassified, compromised TSK could result in disrupted communications on your NET.
2. Report immediately the loss of any fill devices to your NCS.
3. Remember that the MX-10579 zeroize function is different than that on the KYK-13. Once the zeroize is activated on the MX-10579, all variables will be lost, and selective zeroize is not possible.

Annex E - Radio Operations

1. Ensure that your radios are manned and ready for use at the time prescribed by NCS for the initial NST ERF.

- Function switch set to LD.
- Preset at MAN.
- Mode switch at FH.
- Power set at LO until directed to change by NCS.

TSK, LOCKOUTS, last two digits of JD, hopsets, and net ID loaded prior to COLD START.

2. Remember that the radio clock stops keeping correct time after the RT has been shut OFF for more than 24 hours. To reenter the NET, the operator should clear all NST from the radio by using the keyboard TIME and CLEAR buttons. CUE the NET and request an ERF. Failure to CLEAR old NST prior to ERF could result in the wrong NST update.

3. Remember the radio clocks drift or build small errors as time progresses. The radio attempts to correct these errors with each message that is received and small variations ± 3 seconds between different nets in one radio is not uncommon. Minimize this time error buildup by keeping your radios ON as much as possible, since errors accumulate faster in the OFF position.

4. Check in with NCS on all preset positions at least once every 24 hours and request a LNE update. This keeps your clock in time sync with the NET and cancels gradual time error buildup. Remember an FH/M radio cannot enter the LNE mode, therefore, a LNE request must be made in the FH mode.

5. Remember that the KY-57 does not have an auto PLAIN/CYPHER (PT Override) capability on FH NETs. This means that any radio in an FH NET with its associated KY-57 set to the CT mode can only receive a call with the correct TEK for that NET.